A revision of *Clematis* sect. *Tubulosae* (Ranunculaceae)*

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**Abstract**  *Clematis* sect. *Tubulosae* is revised in this paper. Nine species, two varieties, and three forms are recognized and classified into two subsections. An identification key is provided, and each species is described and illustrated. Brief taxonomic history is given, along with a summary of pollen morphology and geographical distribution. The relationships among the infrasectional groups are also discussed: Subsect. *Pinnatae*, characterized by its scandent habit, bisexual flowers, white or pinkish, at length spreading, obovate-oblong sepals, and tricolpate pollen, is regarded as the more primitive group, whereas subsect. *Tubulosae*, characterized by its erect habit, usually polygamous flowers, blue or purple, erect, usually narrowly oblong sepals, and usually pantoporate pollen, is regarded as the more advanced group of the section. Subsect. *Pinnatae* is believed to have originated from sect. *Clematis* in Central or East China, and subsect. *Tubulosae* might be derived from subsect. *Pinnatae*.

**Key words**  *Clematis*, sect. *Tubulosae*, Ranunculaceae, taxonomic review.

1  Brief taxonomic history

The first species of *Clematis* L. sect. *Tubulosae* Decne. known to science is *C. heracleifolia* DC., which was described in 1818 by de Candolle on the basis of a flowering specimen collected by an English officer, G. L. Staunton, from the north of Beijing, China in 1793. This species was placed in the large and heterogeneous sect. *Flammula* by de Candolle. Afterwards, Turczaninow (1837) and Siebold and Zuccarini (1845) described two new species closely allied to *C. heracleifolia*, *C. tubulosa* Turcz. and *C. stans* Sieb. & Zucc., from Beijing, China and Honshu, Japan, respectively. In 1877, in a paper dealing with the genus *Clematis* of China and Japan, Maximowicz described two new species, *C. tatarinowii* Maxim. and *C. pinnata* Maxim., on the basis of two gatherings collected from Beijing by A. A. Tatarinow. Maximowicz placed *C. tatarinowii* near *C. tubulosa* based on the fact that they both have erect sepals, and placed *C. pinnata* near *C. brevicaudata* DC. and *C. grata* Wall., two members of sect. *Clematis* subsect. *Clematis* (Wang, 2003), according to the fact that all three species have spreading sepals. Maximowicz (1877) did not, however, notice that the stamen filaments of his two new species bear a few hairs near apex. Besides, in his enumeration of the Asian *Clematis* species, *C. heracleifolia* was not included, and in an annotation under *C. tubulosa*, Maximowicz cast doubt upon the identity of this species with *C. tubulosa*.

In 1867, Verlot published a new species, *Clematis davidiana*, named by M. J. Decaisne, on the basis of flowering specimens collected by P. A. David from Beijing in 1863. In 1881, Decaisne provided a revision of the species of the *C. tubulosa* group, and established a new section to accommodate them, sect. *Tubulosae*. In it, seven species were recognized (viz. *C. tubulosa*, *C. stans*, *C. davidiana*, and four new species, *C. hookeri* Decne., *C. kousabotan* Decne., *C. lavallei* Decne., and *C. savatieri* Decne.); *C. heracleifolia* was not included. In fact, however, *C. heracleifolia* was misidentified by Verlot (1867) as *C. tubulosa*, and in 1937, each of the five new species named by Decaisne was reduced into synonymy by Kitagawa under...
one of three species, *C. heracleifolia*, *C. tubulosa*, and *C. stans*.

In a paper dealing with four Chinese species of *Clematis*, Forbes (1884) concluded that *C. heracleifolia* and *C. tubulosa* were the same entity, as previously suspected by Maximowicz (1877), and relegated *C. tubulosa* to the synonymy under *C. heracleifolia*. This treatment was subsequently adopted by many authors, including Forbes and Hemsley (1886), Finet and Gagnepain (1903), Rehder and Wilson (1913), Handel-Mazzetti (1939), Anonymous (1972), Fang (1980), and Wang and Bartholomew (2001), sustaining a taxonomic confusion that has lasted for more than one hundred and twenty years.

In his monograph of the genus, Kuntze (1885) for the first time associated *C. pinnata* with *C. heracleifolia* based on the fact that the sepals of these two species at the beginning of anthesis are erect and closely connivent, and during anthesis gradually separate from top downwards. These two species were placed in his sect. 3 *Escandentes*. Kuntze (1885) also treated *C. tatarinowii* as a variety under *C. pinnata*, and recognized several other previously described species as infraspecific taxa within *C. heracleifolia*, including four treated as subspecies (*C. davidiana*, *C. stans*, *C. lavallei*, and *C. savatieri*) and one as a variety (*C. tubulosa*).

Prantl (1888), in his classification of *Clematis*, followed Kuntze by continuing the association of *C. heracleifolia* and *C. stans* with *C. tatarinowii*, placing them in sect. *Viorna* 4 *Tubulosae*, although he did not mention *C. pinnata*. At the same time, in the infrasectional group *Tubulosae*, Prantl misplaced the species of the *C. connata* group, which are now regarded as close allies of the *C. viorna* group (Wang & Li, 2005).

In 1907, Makino described a new species, *C. takedana* Makino, based on a specimen collected from Shinano, Japan by H. Takeda, regarding this new species as a hybrid between *C. apiifolia* DC., a member of sect. *Clematis* (Wang, 2003), and *C. stans*, a member of sect. *Tubulosae*. Makino’s viewpoint was accepted by Kitagawa (1937), Ohwi (1965), and Tamura (1982). Unfortunately, Makino was unaware of the fact that *C. takedana* is a close ally of the Chinese *C. pinnata* (Wang, 2001; Wang & Li, 2005).

In 1937, Kitagawa published the second revision of the *C. tubulosa* group, in which he recognized seven species, *C. speciosa* (Makino) Makino, *C. stans*, *C. heracleifolia*, *C. tubulosa*, *C. tsugetorum* Ohwi, *C. urticifolia* Nakai ex Kitagawa and *C. psilandra* Kitagawa, the latter two of which were described as new. In his revision, the morphological differences between *C. heracleifolia* and *C. tubulosa* were clearly given, and the confusion about the identities of these two species created by Decaisne (1881), Forbes (1884), Forbes & Hemsley (1886), Finet & Gagnepain (1903), and Rehder & Wilson (1913) was clarified. As to the relationships of the *C. tubulosa* group, Kitagawa (1937: p. 344) stated that “this group is phyletically old and its evolution had either stopped already or is just stopping. One can hardly trace back its phyletical connection with other sections, nor can make out the same of each species”. Kitagawa’s above point of view appears to show that he was ignorant of the presence of a group closely related to the *C. tubulosa* group and consisting of *C. pinnata* and *C. takedana*, which he followed Makino to treat as a hybrid between *C. apiifolia* and *C. stans* as mentioned above.

Two years later, in his revision of the Chinese *Clematis*, Handel-Mazzetti (1939) adopted Prantl’s treatment of the *C. heracleifolia* group, and placed *C. heracleifolia* and *C. tatarinowii* in sect. *Viorna* subsect. *Tubulosae*. However, he erroneously referred *C. pinnata* to sect. *flammula* DC. subsect. *vitalbae* Prantl (=sect. *Clematis* subsect. *Clematis*—Wang, 2003). His misplacement of *C. pinnata* was later adopted by Ting (1980), Johnson (1997), and Grey-Wilson (2000). Moreover, Handel-Mazzetti (1939) did not agree with Kitagawa (1937) in recognizing *C. heracleifolia* and *C. tubulosa* as distinct species, and instead followed Rehder & Wilson (1913) by maintaining the reduction of *C. tubulosa* into the synonymy under *C. heracleifolia*, as mentioned above.
In the classification of *Clematis* published by Tamura (1995), sect. *Tubulosae*, placed near the *C. connata* group (sect. *Campanella* Tamura), comprises only the species of the *C. tubulosa* group, and does not include *C. pinnata* or *C. takedana*. Tamura’s sect. *Tubulosae s.s.* was adopted by Snoeijer (1992) and elevated to subgeneric rank by Yang (Yang & Moore, 1999).

In the monograph of *Clematis* published by Johnson (1997), sect. *Tubulosae* was likewise placed near the *C. connata* group, as had been done by Tamura (1995), and was circumscribed to contain *C. tatarinowii* as well as the seven species recognized by Kitagawa (1937); *C. pinnata* was erroneously referred to sect. *Clematis* as Handel-Mazzetti (1939) had done. Johnson’s treatment of sect. *Tubulosae* was adopted by Grey-Wilson (2000), although the group was elevated to subgeneric rank.


In 2003, in the course of field studies in the hilly regions of Beijing, Shi found that *C. pinnata* is highly variable in leaf division, and can not be distinguished from *C. tatarinowii*. In her master degree dissertation, this author reduced *C. tatarinowii* Turcz. and *C. pinnata* var. *ternatifolia* W. T. Wang into the synonymy under *C. pinnata*. In 2005, in a paper by Xie et al., this reduction was formally published.

### 2 Pollen morphology

#### 2.1 Materials and methods

Pollen grains from seven species and two varieties of *Clematis* sect. *Tubulosae* were investigated using Scanning Electron Microscopy (SEM) (Table 1), of which four species and two varieties were examined for the first time, i.e. *Clematis takedana*, *C. speciosa*, *C. tubulosa* var. *tubulosa*, *C. tubulosa* var. *ichangensis*, and *C. stans* var. *austrojapanensis*. Pollen samples were obtained from the following collections: the Herbarium of Institute of Botany, the Chinese Academy of Sciences (PE), the Herbarium of Kagoshima University Museum (KAG), and the Herbarium of Kyoto University (KYO). Pollen grains were prepared from herbarium material without special treatment. Anthers were broken to release the pollen directly onto aluminium stubs, sputtered with gold, and then observed and photographed using a Hitachi S-800 SEM unit. The values of *P* (polar axis length) and *E* (equatorial diameter) were measured, and means were calculated based on examination of 20 pollen grains. Descriptive terminology follows Clarke et al. (1991).

#### 2.2 Results

The pollen characters of all taxa examined are summarized based on observations from SEM (Table 1).

Pollen grains of taxa assigned to sect. *Tubulosae* are of two types, one tricolpate and the other pantoporate. The pollen is radially symmetrical, isopolar, and spheroidal to prolate with broad or relatively narrow poles. The grains are small to medium-sized, *P* (polar axis length) 20.1–24.8 μm × *E* (equatorial diameter) 15.4–22.8 μm for tricolpate pollen, with a diameter from 18.7 μm to 22.6 μm for pantoporate pollen. They are elliptical to circular in equatorial outline, and their surface is uniformly ornamented with microechinate (conical spinules) that are evenly distributed on the microperforate tectum. The apertures are tricolpate or pantoporate, and the colpi are narrow or broad with distinct and straight, but incised margins, sunken or open in tricolpate grains. The colpus membrane is often covered with granular or microechinate elements usually more or less of the same size or larger than those on the

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Table 1  Pollen characteristics in Clematis sect. Tubulosae

<table>
<thead>
<tr>
<th>Taxon</th>
<th>Type of aperture</th>
<th>Size (polar × equatorial) (μm)</th>
<th>Shape*</th>
<th>Colpus (in width) or pore (in diam.) (μm)</th>
<th>End of corpus</th>
<th>Colpus or pore membrane</th>
<th>Figure</th>
<th>Locality</th>
<th>Voucher</th>
</tr>
</thead>
<tbody>
<tr>
<td>C. pinnata</td>
<td>tricolpate</td>
<td>(21.3–24.8) × 22.9</td>
<td>SP</td>
<td>2–3 (in width)</td>
<td>acute</td>
<td>dense conical spinules</td>
<td>1: A, B</td>
<td>Baihuashan, Beijing, China</td>
<td>S. Y. Ho 15037 (PE)</td>
</tr>
<tr>
<td>C. takedana</td>
<td>tricolpate</td>
<td>(20.3–23.7) × 21.6</td>
<td>SP</td>
<td>2–3 (in width)</td>
<td>acute</td>
<td>dense conical spinules</td>
<td>1: C, D</td>
<td>Mt. Shirouma-yama, Shimano, Japan</td>
<td>G. Koidzumi s.n. (KYO)</td>
</tr>
<tr>
<td>C. heracleifolia</td>
<td>tricolpate</td>
<td>(20.1–24.5) × 23.6</td>
<td>P</td>
<td>3–4 (in width)</td>
<td>acute</td>
<td>dense conical spinules</td>
<td>1: E, F</td>
<td>Ji Xian, Tianjin, China</td>
<td>T. N. Liou 4521 (PE)</td>
</tr>
<tr>
<td>var. tubulosa</td>
<td>pantoporate</td>
<td>(18.5–22.4) × 20.6</td>
<td>S</td>
<td>3–5 (in diam.)</td>
<td>–</td>
<td>dense conical spinules</td>
<td>2: C, D</td>
<td>Dalian, Liaoning, China Hua Shan, Shaanxi, China</td>
<td>Z. Wang &amp; Y. X. Liu 889 (PE)</td>
</tr>
<tr>
<td>var. ichangensis</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Boufford et al. 25833 (PE)</td>
</tr>
<tr>
<td>C. speciosa</td>
<td>pantoporate</td>
<td>(18.7–22.1) × 20.9</td>
<td>S</td>
<td>4–7 (in diam.)</td>
<td>–</td>
<td>dense hemispherical spinules or conical spinules</td>
<td>1: K, I</td>
<td>Mt. Shiraiwa, Hyuga, Japan</td>
<td>S Hatusima &amp; S Sako 26198 (KYO)</td>
</tr>
<tr>
<td>C. stans var. stans</td>
<td>pantoporate</td>
<td>(20.5–21.8) × 21.1</td>
<td>S</td>
<td>3–4 (in diam.)</td>
<td>–</td>
<td>dense conical spinules</td>
<td>1: G, H</td>
<td>Shizuoka, Japan</td>
<td>F. Chikata 15778 (PE)</td>
</tr>
</tbody>
</table>

* S, spheroidal; SP, subprolate; P, prolate.

tectum. On pantoporate grains, the pores are irregular in shape and distribution, often obscure. The membrane of the pores is often covered with granular or microechinate elements usually the same size or larger than those on the tectum (Figs. 1, 2).

Among the members of sect. Tubulosae, all except C. pinnata, C. takedana and C. heracleifolia have pantoporate pollen grains, which represent the relatively advanced pollen type in Clematis (Xie, 2005), whereas C. pinnata, C. takedana and C. heracleifolia show a primitive pollen type. Pollen morphology is thus, at least to some extent, systematically significant in sect. Tubulosae.

3 Relationships among the infrasectional groups

The species of sect. Tubulosae fall distinctly into two groups that are easily distinguishable on the basis of habit and floral structure.

The first group, subsect. Pinnae, consists of two closely allied species, the Chinese C. pinnata and the Japanese C. takedana, in which the stems are woody, scandent or prostrate, the leaves are 1–2-ternate or 1–2-pinnate, the flowers are bisexual, arranged in panicle-like compound cymes, the sepals are white or pinkish in colour, obovate-oblong in outline, at


Scale bar: A, C, E, I, K, 8.6 μm; B, D, F, H, J, L, 3 μm; G, 10 μm.
apex, and the pollen grains are tricolpate\(^\text{①}\) (Xie, 2005).

The seven species of the second group, subsect. *Tubulosae*, are erect perennial herbs, small subshrubs or shrubs, with usually ternate, rarely pinnate leaves. Their floral structure is essentially similar to that of subsect. *Pinnatae*, differing in the usual abortion of one whorl of sexual organs, in their sepals being usually blue or purple in colour, always erect, usually narrowly oblong in outline, more closely connivent during anthesis, and only being recurved above after anthesis. Moreover, their pollen grains are usually pantoporate, rarely tricolpate\(^\text{①}\) (Yang & Huang, 1992; Nowicke & Skvarla, 1995; Xie, 2005), as shown in Figs. 1, 2 and Table 1.

In subsect. *Tubulosae*, most species are perennial herbs or subshrubs, and have ternate leaves and large, terminal, many-flowered panicle-like compound cymes with clustered flowers. Only one species, *C. tsugetorum*, an endemic of Taiwan Island, China, is a small shrub with ternate or pinnate leaves and solitary terminal flowers (the solitary terminal flowers may result from the reduction of the many-flowered compound cymes due to the adaptation to the harsh alpine climate); most species have polygamous or unisexual flowers and pantoporate

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pollen grains, only *C. heracleifolia* has bisexual flowers and tricolpate pollen grains. Also, most species have narrowly oblong sepals that are slightly dilated near apex after anthesis, whereas only *C. urticifolia* has lanceolate undilated sepals and only *C. tubulosa* var. *tubulosa* has sepals strongly dilated above after anthesis.

From the morphological and palynological characters mentioned above several evolutionary trends can be seen within sect. *Tubulosae*. A scandent habit, ternate leaves, many-flowered cymes, bisexual flowers, white, undilated or slightly dilated sepals, and tricolpate pollen grains may represent the primitive states, while an erect habit, 1–2-pinnate leaves, solitary, terminal, polygamous or unisexual flowers, blue or purple, strongly dilated sepals, and pantoporate pollen grains may represent the derived states.

*Clematis pinnata*, a member of subsect. *Pinnatae*, was misplaced in sect. *Clematis* by Handel-Mazzetti (1939) and other botanists, as mentioned above. In fact, *C. pinnata* shows a striking resemblance to *C. grata* and *C. brevicaudata* of sect. *Clematis* in habit, floral structure, and pollen morphology (Xie, 2005), differing from them only in its sepals being suberect at the beginning of anthesis and in having pilose stamen filaments. The misplacement of *C. pinnata* in sect. *Clematis* and the resemblance of *C. pinnata* to species of sect. *Clematis* may thus imply that subsect. *Pinnatae* is the more primitive group of sect. *Tubulosae*, and might have been derived from sect. *Clematis*, and that the two close allies of this subsection, *C. pinnata* and *C. takedana*, might be sister taxa derived from a species (probably *C. apiifolia* DC.) of sect. *Clematis*. This speculation regarding the derivation of sect. *Tubulosae* from sect. *Clematis* is supported by a recent palynological study of the genus (Xie, 2005). As to the systematic position of subsect. *Tubulosae*, it is believed to be the more advanced group of sect. *Tubulosae* in having unisexual flowers, blue or purple, narrowly oblong sepals, pantoporate pollen grains, and other advanced features, and might be derived from subsect. *Pinnatae* (Wang, 2001; Wang & Li, 2005).

*Clematis takedana* was regarded as a hybrid between *C. apiifolia* (Sect. *Clematis*) and *C. stans* (sect. *Tubulosae*) by Makino (1907) and several later botanists, as mentioned above. Interestingly, this interpretation is not unique and has other counterparts within the genus. For example, in 2003, Shi Ψ suggested that *C. pinnata* might be a hybrid between *C. brevicaudata* (sect. *Clematis*) and *C. heracleifolia* (sect. *Tubulosae*). As indicated above, *C. pinnata* and *C. takedana* have similar habit and floral structure, which clearly shows that they are closely related. It is thus difficult to interpret why these two closely related species represent hybrids produced from different parentages occurring in different regions, and further studies are needed to resolve this issue.

### 4 Geographical distribution

As indicated above, *Clematis* sect. *Tubulosae*, widespread in eastern Asia, is here defined to consist of nine species, two varieties, and three forms.

The more primitive group within the section, subsect. *Pinnatae*, consists of two species. Regarding *C. pinnata*, most populations are concentrated to the northern and western mountains surrounding the city of Beijing and in several neighboring counties of Hebei Province and Tianjin, with two outliers in Shenyang, Liaoning Province and in Harbin, Heilongjiang Province, respectively (Fig. 3). This curious distribution pattern appears to imply that the past range of *C. pinnata* might have been larger than at present, being widespread in North and Northeast China, and that following the Quaternary glacial periods it was strongly reduced, with the northern populations remaining in two refugia. The second species, *C. takedana*,

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Fig. 3. Map showing the distribution of the two species of subsect. *Pinnatae*.

is restricted to central and northern Honshu Island, Japan (Ohwi, 1965). Given that *C. pinnata* and *C. takedana* are close allies and that the islands of Japan have been separated from the Asian continent since the Miocene (Byльф, 1944), the senior author of this paper surmises that these two taxa may be sister groups and might have originated in Central or East China before the Miocene from a common ancestor belonging to sect. *Clematis*, whose present center of distribution is situated in Southwest China (Wang, 2003).

The more advanced subsect. *Tubulosae* consists of seven species, two varieties, and one form, ranging from the middle and lower reaches of the Changjiang and Huanghe Rivers, southern Nei Mongol, Liaoning and Taiwan Provinces of China eastward via Korea to Japan (Fig. 4). The most primitive species of this subsection, *C. heracleifolia*, is widespread in the middle and lower parts of the Huanghe River, southern Nei Mongol, and Liaoning Province of China and in northern Korea. Elsewhere in Asia two other species occur, *C. tubulosa* (with var. *tubulosa* occurring in North China and northern Korea, and var. *ichangensis* widespread in middle and lower reaches of the Changjiang River and Huanghe River) and *C. urticifolia* occurring in Korea. All three of these species inhabit hills or mountains at low to moderate altitudes. On the other hand, the two species endemic to Taiwan Island are found in higher montane or alpine regions: *C. psilandra* occurs from 1000 to 2500 m above sea level, and the most advanced species of subsect. *Tubulosae*, *C. tsugetorum*, grows from 2400 to 3600 m. Three species occur in Japan, *C. urticifolia* (Sado Island—Ohwi, 1965), and two endemics, *C. speciosa* and *C. stans* (Fig. 4). The latter, with its unisexual flowers and dioecious individuals, may be one of the advanced species in subsect. *Tubulosae*.

On the basis of a recent palynological study of the genus *Clematis*, Xie (2005) pointed out that sect. *Tubulosae* might have originated in eastern Asian and subsequently extended eastward to Japan. The senior author of this paper would agree with this idea.
Fig. 4. Map showing the distribution of the species and varieties of Clematis subsect. Tubulosae. The distribution of *C. tubulosa* var. *tubulosa*, *C. urticifolia*, *C. speciosa*, and *C. stans* in Korea and Japan is based on the data given by Kitagawa in 1937.

5 Taxonomic treatment


Woody vines, erect perennial herbs, low subshrubs or low shrubs. Seedling leaves alternate (only known from *C. heracleifolia*—Essig, 1991). Leaves 1–2-ternate or 1–2-pinnate; leaflets dentate. Flowers bisexual or unisexual. Sepals 4, valvate, suberect or erect, white, blue or purple, obovate-oblong, narrowly oblong, or lanceolate. Stamen filaments linear, usually pilose near apex. Pollen grains tricolpate or pantoporate. Achenes compressed but not
flattened; persistent styles elongate, plumose.

Nine species, widespread in eastern Asia.

**Key to infrasectional taxa**

1. Woody vines; leaves 1–2-ternate or 1–2-pinnate; flowers in axillary or terminal panicles, bisexual; sepals suberect at beginning of anthesis, thereafter spreading, white or pinkish, obovate-oblong; pollen grains tricolpate

   Subsect. 1. **Pinnatae**

2. Sepals white, apex acute or shortly cuspidate; leaves 1–2-ternate or 1–2-pinnate

   1. **C. pinnata**

3. Erect perennial herbs, or low subshrubs or shrubs; leaves ternate, rarely pinnate; flowers usually polygamous, rarely bisexual; sepals always erect, blue, purple, or pink, usually narrowly obovate-oblong, rarely lanceolate or above strongly dilated and elliptic, firmly connivent during anthesis, near apex or above recurved; pollen grains pantoporate, rarely tricolpate (*C. heracleifolia*)

   Subsect. 2. **Tubulosae**

4. Calyx urceolate or tubular-urceolate; sepals lanceolate or narrowly obovate-oblong, near apex slightly dilated, rarely strongly dilated above after anthesis.

   5. **C. urticifolia**

7. Pedicels more or less slender, densely puberulous, rarely velutinous; sepals only near apex slightly dilated after anthesis.

   8. Persistent styles villous from base to near apex.

      9. Flowers bisexual; pedicels densely puberulous; sepals 16–23(–30) mm long; pollen grains tricolpate

         Subsect. 1. **Pinnatae**

   9. Flowers polygamous; pedicels velutinous; sepals 14–20 mm long; pollen grains pantoporate

      Ser. 2. **Uniflorae**

   10. Anthers 3–3.8 mm long

      Ser. 1. **Tubulosae**

   11. Anthers 4–5 mm long

      Ser. 1. **Pinnatae**


Woody vines. Leaves 1–2-ternate or 1–2-pinnate. Inflorescences axillary and terminal, usually many-flowered. Flowers bisexual. Sepals suberect or ascending at beginning of anthesis, thereafter spreading, white or pinkish, obovate-oblong, not connivent during anthesis. Pollen grains tricolpate.

Two species, one occurring in China, the other in Japan.

1. Clematis pinnata


C. tatarinowii


C. pinnata var. ternatifolia


羽叶铁线莲

Fig. 1: A, B; Fig. 5; Fig. 6: A–C

Woody vine. Branches shallowly 4–6-sulcate, appressed-puberulous, often glabrescent. Leaves usually 5-foliately pinnate, sometimes 1–2-ternate or 2-pinnate; leaflets papery or herbaceous, ovate, broadly ovate, or rhombic, (2.5–)5–13×(1.5–)3–7.5 cm, apex acuminate, base rounded or subcordate, margin dentate, 2–3-lobed or undivided, sparsely appressed-puberulous on both surfaces, abaxial surface laxely reticulate, basal veins abaxially prominent; petioles 3–11 cm long. Cymes axillary or terminal, usually many-flowered; peduncles 3–8 cm long, puberulous; bracts triangular, long elliptic or lanceolate, 3–10 mm long, sometimes ternate, 3 cm long. Flower 1.5–2 cm in diam.; pedicel 0.5–3 cm long, densely puberulous. Sepals 4, white, obovate-oblong, 12–19×3–5 mm, glabrous inside, densely puberulous outside, velutinous on margin, apex acute or shortly cuspidate. Stamens 7–10 mm long; filaments pilose or glabrous near apex; anthers linear or narrowly oblong, 2.5–3 mm long, glabrous or pilose, apex minutely apiculate. Ovaries puberulous; styles ca. 5 mm long, densely villous. Fl. Jul.–Aug.

China (Beijing, W & N Hebei, S Heilongjiang, S Liaoning, NW Tianjin). On slopes, in bushes, or at field edges; alt. 700–1600 m.

Additional specimens examined:

China. Beijing (北京): Haidian (海淀), Jin Shan (金山), S. Y. He (贺士元) s.n. (BNU); Jiufeng (鹫峰), J. H. Shi et al. (史京华等) 2002037 (PE); Huairou (怀柔), Shuai (沙峪), Anonymous 621 (PE); Mentougou (门头沟), Baihua Shan (百花山), S. Y. He (贺士元) 15037, J. H. Shi et al. (史京华等) 2002055 (PE); Miyun (密云), Wuling Shan (雾灵山), PE Exped. (植物所标本馆队) 56-2276 (PE), Q. R. Liu (刘全儒) 978047, 987039 (BNU); Pingu (平谷), Nanshan Cun (南山村), S. Y. He (贺士元) s.n. (BNU); Shijingshan (石景山),
Fig. 5. *Clematis pinnata* Maxim. A, flowering branch; B, flower; C, stamens. Drawn from Pinggu Exped. 224.
Xi Shan (西山), Anonymous 735 (PE); Yanqing (延庆), Licent 9831 (PE); Without precise locality, Bretschneider 25 (GH, K, LE), Hemeling s.n. (K), Lechman s.n. (K). **Hebei** (河北): Qinglong (青龙), Chengde Exped. (承德队) 71-1775 (PE); Xiaowutai Shan (小五台山), Limpricht 627 (S), K. S. Hao (郝景盛) s.n. (PE); Without precise locality, Chanet & Serre 2886 (P), Serre 9831 (TIE). **Heilongjiang** (黑龙江): Harbin (哈尔滨), Licent 9221 (TIE). **Liaoning** (辽宁): Shenyang (沈阳), Dongling (东陵), Yabe s.n. (NAS). **Tianjin** (天津): Jixian (蓟县), Pan Shan (盘山), S. Y. He (贺士元) 17407 (BNU).


Woody vine. Branches shallowly 6–8-sulcate, appressed-puberulous. Leaves ternate, rarely 5-foliately pinnate; leaflets papery, broadly ovate or ovate, 3–8.2×1.4–8 cm, apex acuminate, base rounded or subtruncate, margin irregularly dentate, 2–3-lobed, adaxial surface sparsely appressed-puberulous, abaxial surface puberulous on veins, basal veins abaxially prominent; petioles 4.5–5 cm long. Cymes axillary or terminal, usually many-flowered, panicle-like; peduncles 0.4–4 cm long; bracts triangular, ca. 2 mm long, densely puberulous.

Flower ca. 1.4 cm in diam.; pedicel slender, 6–16 mm long, densely appressed-puberulous. Sepals 4, pinkish or purplish, narrowly obovate-oblong, 9–15×2–3.6 mm, glabrous inside, densely appressed-puberulous outside, velutinous on margin, apex subtruncate or truncate. Stamens 6–9(–11) mm long; filaments pilose near apex; anthers linear, 2–3 mm long, below pilose, apex acute or minutely apiculate. Ovaries puberulous; styles ca. 6 mm long, densely villous. Fl. Aug.–Sept. Japan (C & N Honshu).

Additional specimens examined:

Japan. Akita: Kazunogun Hachimantai, Matsumura s.n. (KYO); Nagano: Mt. Shiroumayama, Makino 95711, Koidzumi s.n. (KYO), Shishu, Koidzumi s.n. (KYO); Nagaro, Hisauchi & Kimura 2145 (TI).


Erect perennial herbs or low subshrubs. Leaves ternate. Flowers in terminal, many-flowered, panicle-like compound cymes. Pollen grains pantoporate, rarely tricolpate.

Seven species, distributed in E China, Korea, and Japan.

Fig. 6. A–C, *Clematis pinnata* Maxim. A, flowering branch; B, sepal outside; C, stamen. Drawn from *S. Y. He 15037.* D–F, *C. takedana* Makino. D, flowering branch; E, sepal outside; F, stamen. Drawn from *Hisauchi & Kimura 2145.*
Six species, distributed in E China, Korea, and Japan.


大叶铁线莲 Fig. 1: E, F; Fig. 7

Perennial herb or subshrub. Stems 20–70 cm tall, longitudinally sulcate, appressed-puberulous. Leaves ternate; terminal leaflets chartaceous, broadly ovate, rhombic, or elliptic, 6–16 × 4.5–13.5 cm, apex acute or acuminate, base subtruncate, rounded, or broadly cuneate, margin irregularly dentate or incised-dentate, 3-lobed, rarely undivided, adaxial surface subglabrous, abaxial surface reticulate, puberulous on veins; lateral leaflets smaller, slightly unsymmetrical; petioles 6–16 cm long. Terminal secondary panicles 9–30 cm long, with 2–6 nodes and with flowers 2–5 fascicled in each bract axil; lateral secondary panicles 2.5–12 cm long, with 1–2 nodes; bracts ternate or simple, ovate, those of fascicled flowers linear-lanceolate, 2–6 mm long, densely puberulous. Flowers bisexual, 1.5–2 cm in diam.; pedicels more or less slender, 1.2–3.4 (–4.5) cm long, densely puberulous. Sepals 4, blue-purple, narrowly obovate-oblong or linear, 16–23 (–30) × (2–)3–6 mm, slightly dilated and recurved near apex, glabrous inside, densely appressed-puberulous outside, velutinous on margin, apex acuminate or acute. Stamens ca. 16, 9–12.5 mm long; filaments 5–8 mm long, sparsely puberulous or glabrous near apex; anthers linear, 4–6.8 mm long, on connective pilose; pollen grains tricolpate. Carpels ca. 4 mm long, densely villous. Achenes compressed, rhombic-elliptic, 3.4–4.5 × 1.5–2.2 mm, appressed-puberulous; persistent styles 1.2–2.5 cm long, plumose. Fl. Jul.–Sept.

China (Beijing, Hebei, Henan, Liaoning, Nei Mongol, Shandong, Shansi, NW Tianjin) and N Korea. In grassy places on slopes or in sparse forests; alt. 85–1600 m.
Fig. 7. *Clematis heracleifolia* DC. A, upper part of flowering stem; B, sepal inside; C, stamen. Drawn from Y. Liu 11893. D, achene. Drawn from Changping Exped. 121.
Additional specimens examined:

China. Beijing (北京): Changping (昌平), Baihecun (百合村), Changping Exped. (昌平队) 121 (PE), Duibaiyu (堆白峪), K. C. Kuan et al. (关克俭等) 12 (PE), Nankou (南口), H. F. Chow (周汉藩) 41588 (PE), Xiakou (下口), PE Exped. (植物所标本队) 56-1518 (PE); Fangshang (房山), Shangfeng Shan (上方山), H. F. Chow (周汉藩) 41707, T. N. Liou (刘慎谔) 8326, W. Y. Hsia (夏纬瑛) 3217 (PE); Haidian (海淀), Dajuiesi (大觉寺), Read 727 (GH); Wofosi (卧佛寺), Cowdry 1009 (BNU, GH), Z. Y. Cao (曹子余) 39 (PE); Mentougou (门头沟), Biaihua Shan (百花山), T. F. King (金德福) 599 (PE, S), C. G. Yang (杨朝广) 526 (PE), Miaofeng Shan (妙峰山), PE Exped. (植物所标本队) 56-2771 (PE), Qianjuntai (千军台), W. T. Wang (王文采) 3092 (PE), Xiaolongmen (小龙门), Z. Y. Mi (米志勇) s.n. (BNU); Shijingshan (石景山), Xi Shan (西山), T. N. Liou (刘慎谔) 1395 (K, PE), 1396 (PE); Yanqing (延庆), Badaling (八达岭), Z. Y. Cao (曹子余) 92 (PE), Song Shan (松山), D. Z. Fu & Q. Y. Xiang (傅德志, 向秋云) 163 (PE).

Hebei (河北): Neiqiu (内邱), S. Y. He (贺士元) 2289 (BNU); Wuan (武安), S. Y. He & R. T. Yin (贺士元, 尹汝棠) 21138 (BNU); Xiaowutai Shan (小五台山), Y. Liu (刘瑛) 11349, 11893 (PE), Hers 2181 (GH); Xiongyuecheng (熊岳城), H. Smith 312 (GH); Zuhou (啄鹿), Yangjiaping (杨家坪), H. Smith 3620 (PE); Tongbai (桐柏), M. Cho (崔友文) 4594 (LE, PE); Xinglong (兴隆), T. N. Liou & P. Y. Fu (刘慎谔, 傅沛云) 4594 (LE, PE); Xingtai (邢台), H. F. Chow (周汉藩) 43430 (PE); Yi Xian (易县), X. L. Huang et al. (黄秀兰等) 868 (PE); Zhoulu (涿鹿), Zhangjiaping (张家口), H. Smith 3620 (PE); Tai Shan (泰山) 98001-7 (PE); Tai Shan (泰山) 7182, 7321 (NAS, PE); Yantai (烟台), H. Smith 312 (GH); Zuhou (啄鹿), Yabe s.n. (PE); Qian Shan (千山), K. K. Tsoong (钟观光) 2289 (BNU); Changping (昌平), T. N. Liou et al. (刘慎谔等) 6821 (PE), Y. L. Zhou et al. (周以良等) 2542 (LE, NAS, PE); Shenyang (沈阳), T. N. Liou et al. (刘慎谔等) 359 (IFP); Xiongyuecheng (熊岳城), Y. L. Zhou et al. (周以良等) 2650 (PE); Tai Shan (泰山), T. Y. Chou et al. (周太炎等) 7182, 7321 (NAS, PE); Yantai (烟台), Forbes s.n. (BM), K. M. Liou (刘继孟) 1593 9PE). Shandong (山东): Changqing (长清), C. Y. Guo (郭成勇) 55187-10 (PE); Jinan (济南), Longdong (龙洞), C. Y. Chiao (焦启源) 3073 (GH, K, NAS); Pingyi (平邑), Y. T. Hou et al. (侯元同等) 98001-1, 98001-2, 98001-3, 98001-7 (PE); Tai Shan (泰山), T. Y. Chou et al. (周太炎等) 7182, 7321 (NAS, PE); Taishan (泰山), Y. M. Zuo (朱民亚) 421 (HIMC); Without precise locality, Y. W. Tsui (崔友云) 2818 (PE).

Shanxi (山西): Caohekou (草河口), Yabe s.n. (PE); Qian Shan (千山), T. N. Liou et al. (刘慎谔等) 6821 (PE), Y. L. Zhou et al. (周以良等) 2542 (LE, NAS, PE); Shenyang (沈阳), T. N. Liou et al. (刘慎谔等) 359 (IFP); Xiongyuecheng (熊岳城), Y. L. Zhou et al. (周以良等) 2650 (PE); Tai Shan (泰山), T. Y. Chou et al. (周太炎等) 7182, 7321 (NAS, PE); Yantai (烟台), Forbes s.n. (BM), K. M. Liou (刘继孟) 1593 9PE). Shanxi (山西): Fenyang (汾阳), T. P. Wang (王作宾) 2774 (PE), Jiaocheng (交城), T. Tang (唐进) 1526 (GH, PE); Jixiexiu (计休), H. Smith 7764 (GH, UPS); Licheng (黎城), Licent 11366 (PE); Pingding (平定), K. M. Liou (刘继孟) 3972 (PE); Qianjuntai (千军台), W. T. Wang (王文采) 2289 (BNU); Biaihua Shan (百花山), T. F. King (金德福) 599 (PE, S), C. G. Yang (杨朝广) 526 (PE), Miaofeng Shan (妙峰山), PE Exped. (植物所标本队) 56-2771 (PE), Qianjuntai (千军台), W. T. Wang (王文采) 3092 (PE), Xiaolongmen (小龙门), Z. Y. Mi (米志勇) s.n. (BNU); Shijingshan (石景山), Xi Shan (西山), T. N. Liou (刘慎谔) 1395 (K, PE), 1396 (PE); Yanqing (延庆), Badaling (八达岭), Z. Y. Cao (曹子余) 92 (PE), Song Shan (松山), D. Z. Fu & Q. Y. Xiang (傅德志, 向秋云) 163 (PE).

Nei Mongol (内蒙古): Chifeng (赤峰), Y. M. Zhu (朱民亚) 421 (HIMC); Without precise locality, Y. W. Tsui (崔友云) 2818 (PE).


**4a. var. tubulosa** Fig. 2: C, D; Fig. 8

**4ai. f. tubulosa**

Perennial herb or subshrub. Stems 50–150 cm tall, longitudinally sulcate, densely puberulous. Leaves ternate; terminal leaflets chartaceous, broadly ovate, elliptic, or obovate, 6.5–19 × 5–16 cm, apex acuminate or acute, base subtruncate, rounded, or broadly cuneate, margin irregularly dentate or incised-dentate, 3-lobed or undivided, adaxial surface subglabrous, abaxial surface puberulous on prominent veins; lateral leaflets smaller, slightly unsymmetrical; petioles 4.5–16 cm long. Terminal secondary panicles 10–50 cm long, with 1–4 nodes and with flowers 2–7 fascided in each bract axil, lateral secondary panicles 1.5–18 cm long, with 1–3 nodes, or absent; panicle bracts ternate or simple, ovate; bracts of fascicled flowers triangular or linear-lanceolate, 3–9 mm long, abaxially densely puberulous. Flowers polygamous; pedicels robust, 0.3–2 cm long, densely velutinous. Sepals 4, blue-purple, elliptic or oblong-elliptic above, limb-like, 8–15(–20) × 4–7(–12) mm, recurved, linear below, claw-like, 8–12 × 2–3.5 mm, glabrous inside, appressed-puberulous outside, velutinous on margin. Stamens 12–20, 9–12 mm long; filaments 3–5 mm long, pilose near apex; anthers linear, 5–8 mm long, on connective pilose, apex minutely apiculate; pollen grains pantoporate. Carpels 20–30, 5–7 mm long, densely villous. In staminate flowers there are no sterile carpels. Achenes compressed, elliptic, 3 × 1.8–2 mm, puberulous; persistent styles 1.4–2 cm long, plumose. Fl. Jul.–Sept. China (Beijing, N Hebei, NE Jiangsu, Liaoning, E Shandong, NW Tianjin) and N Korea.

**Additional specimens examined:**

**China. Beijing** (北京): Changping (昌平), Ming Tombs (十三陵), K. M. Liou (刘继孟) 666 (PE), Nankou (南口), H. F. Chow (周汉藩) 40471, 40513 (PE), Xiakou (下口), H. F. Chow (周汉藩) 41986, J. Zhang (张敬) 2023, 2045 (PE), Baihe Cun (百合村), Changping Exped. (昌平队) 41 (PE); Fangshan (房山),
Fig. 8. *Clematis tubulosa* Turcz. var. *tubulosa*. A, upper part of a bisexual flowering plant; B, sepal inside; C, stamen. Drawn from C. G. Yang 197. D, achene. Drawn from W. Wang 3544.
Shangfangan Shan (上方山), W. Y. Xia (夏馥芳) 3217a (PE); Haidian (海淀), Beijing Zoo (北京动物园), T. N. Liou (刘慎谔) 1399 (PE), Qinglongqiao (青龙桥), Z. T. Wang (王忠涛) 156 (PE), Summer Palace (颐和园), W. T. Wang (王文采) 0601 (PE), Wofosi (卧佛寺), Cowdry 41 (BNU), Jin Shan (金山), S. Y. He (贺士元) s.n. (BNU), Dajuasi (大觉寺), Anonymous 8 (PE), Xiang Shan (香山), Bartholomev & Boufford 2038 (GH); Huaqiao (怀柔), Yunmeng Shan (云蒙山), S. Y. He (贺士元) 33088 (BNU); Mentougou (门头沟), Biaohua Shan (百花山), W. Y. Hisia (夏馥芳) 2005, 2583 (PE); Jietai (戒台寺), Bartholomev & Boufford 2060 (GH), Jiulong Shan (九龙山), Hancock s.n. (K); Xiaolongmen (小龙门), T. F. King (金德福) 237 (PE); Miyun (密云), Wuling Shan (雾灵山), S. Y. He (贺士元) 13589 (BNU); Shijingshan (石景山), Xi Shan (西山), H. F. Chow (周汉藩) 42046 (PE); Yanqing (延庆), Song Shan (松山), D. Z. Fu & Q. Y. Xiang (傅德志, 向秋云) 83012 (PE); Without precise locality, 1843, Kirilow s.n. (LE), Bretschneider 1212 (BM). Hebei (河北): Changli (昌黎), W. Y. Hisia (夏馥芳) 1944 (PE); Chengde (承德), Nankai Univ. Exped. (南开大学队) 59-276 (PE); Fengning (丰宁), Z. T. Yin (尹祖荣) 19898 (BNU); Huaihai (怀来), Licent 2494 (K, PE); Jiaotong University (北交大) 21242 (HHBG, NAS); Without precise locality, 1843, Kirilow s.n. (LE), Bretschneider 1212 (BM). Liaoning (辽宁): Beining (北宁), Z. S. Qin et al. (秦志玲等) 531 (IFP); Chaoyang (朝阳), C. R. Liang (梁慈荣) 6 (IFP); Dalian (大连), Z. Wang et al. (王战等) 889 (IFP, LE, PE); Dalu Island (大鹿岛), W. Wang et al. (王薇等) 1286 (IFP); Dandong (丹东), W. Wang et al. (王薇等) 1047 (IFP); Faku (法库), S. Z. Liu (刘淑珍) 133 (IFP); Fengcheng (风城), Z. Wang et al. (王战等) 1628 (LE, PE); Huanren (桓仁), C. S. Wang (王崇书) 4054 (IFP); Jianchang (建昌), C. S. Wang (王崇书) 3221 (IFP); Jinzhou (锦州), Z. Wang et al. (王战等) 3544 (PE); Kelaqin (喀喇沁), C. S. Wang (王崇书) 3705 (IFP); Lingyuan (凌源), S. X. Li (李书馨) 334 (IFP, NAS, PE); Qian Shan (千山), S. X. Li (李书馨) 5916 (IFP); near Shenyang (沈阳), Komarov 708 (GH); Suizhong (绥中), S. X. Li (李书馨) 542 (IFP); Tieling (铁岭), H. W. Kung (孔宪武) 640 (PE); Wafangdian (瓦房店), J. Wei (魏均) 38 (IFP). Shandong (山东): Huang Xian (黄县), Lai Shan (莱山), Z. X. Zhao (赵子孝) 16128 (CAF); Muping (牟平), Kunyu Shan (昆嵛山), T. N. Liou & K. M. Liou (刘慎谔, 刘继孟) 1391, 1485 (PE), Q. R. Liu (刘全儒) 977176 (BNU); Lao Shan (崂山), C. Y. Chiao (焦启源) 2740 (GH, K), 2840 (IBSC, NAS), T. Y. Zhou et al. (周太炎等) 1226 (NAS, PE). Tianjin (天津): Ji Xian (蓟县), Pan Shan (盘山), PE Exped. (植物所标本队) 56-2002 (PE).

Korea. Hamgyong-namdo, Koidzumi s.n. (KYO); Kangwon-do: Mt. Odae National Park, Beyer, Erskine & Cowley 166 (K); Kyonggi-do, Koidzumi s.n. (KYO).

The type specimen of Clematis tubulosa Turcz. was collected from North China by P. Kirilow (Turczaninow, 1837). While working in LE in 2001, I failed to find it, but found two authentic specimens of that species, one flowering and the other fruiting, which were collected also by Kirilow in 1843 from Beijing (Peking). If the type specimen was destroyed or lost, the flowering specimen collected by Kirilow just mentioned, I think, may be designated as the neotype of Clematis tubulosa Turcz.

Var. tubulosa was introduced into cultivation from Beijing by the French plant collector P. A. David in 1863 under the name of Clematis davidiana, and has been involved with other species belonging to sect. Tubulosae or to sect. Clematis to produce several cultivars (Grey-Wilson, 2000).


白花卷萼铁线莲

China (Beijing: Miyun). By stream in valley; alt. 700 m.

This form with short robust pedicels and white sepalas which are strongly dilated above obviously belongs to *C. tubulosa* var. *tubulosa*, and should be transferred to the latter from *C. heracleifolia*.


狭卷萼铁线莲 Fig. 2: A, B; Fig. 9

This variety differs from var. *tubulosa* in its narrowly obovate-oblong or narrowly oblong sepalas, which are slightly dilated and slightly recurved near apex.

Sepals 12–18 × 2.2–7 mm. Stamens 8–11 mm long; filament longer or shorter than anthers, 3.5–6 mm long; anthers 4–6 mm long, apex not or slightly apiculate. Fl. Jun.–Sept.

China (Anhui, S China): Hebei, Henan, W Hubei, S Shanxi, Shandong, Shaanxi, NW Zhejiang). On grassy slopes, in bushes, by streams, or on cliffs; alt. 50–2000 m.

Additional specimens examined:

**China. Anhui (安徽): Huang Shan (黄山), R. C. Ching (秦仁昌) 3032 (K), T. N. Liou & P. C. Tsoong (刘慎谔, 郭本兆) 2809 (PE, WUK), M. J. Wang (王镜名) 3712 (IBSC, NAS, PE); Huoshan (霍山), Pl. Res. Exped. (植物资源队) Da0480 (PE); Jinhai (金寨), X. S. Shen (沈显生) 1596 (ANUB); She Xian (泗县), X. P. Zhang (张小龙) 931 (ANUB); Shucheng (舒城), Z. W. Xie (谢中稳) 97227 (PE). **Guizhou (贵州): Shibing (施秉), Wulingshan Exped. (武陵山队) 88-2570 (PE). **Hebei (河北): Ci Xian (磁县), K. C. Kuan (关克俭) 6117 (PE); Neiqiu (内邱), X. Y. Liu (刘心源) 651 (PE); Xingtai (邢台), Y. Liu & X. Y. Liu (刘瑛, 刘心源) 3712 (IBSC, NAS, PE); Huoshan (霍山), Pl. Res. Exped. (植物资源队) Da0480 (PE); Jinhai (金寨), X. S. Shen (沈显生) 1596 (ANUB); She Xian (泗县), X. P. Zhang (张小龙) 931 (ANUB); Shucheng (舒城), Z. W. Xie (谢中稳) 97227 (PE). **Shaanxi (陕西): Wuding Shan (武当山), R. C. Kuan (刘克荣) 135 (PE); Without precise locality, Henan 7494, E. H. Wilson 2596 (K). **Hunan (湖南): Fenghuang (凤凰), F. Z. Tian (田凤珍) 251 (HUTM); Yuanling (沅陵), G. C. Zhang (张桂才) 564 (PE). **Shanxi (山西): Baoji (宝鸡), H. Z. Peng et al., Encycl. Pl. Three Gorg. Yangtze Riv. China 196. 2005.
The flowers of populations of *Clematis tubulosa* var. *ichangensis* occurring in most provinces of its distribution area are bisexual, and only those of populations occurring in Shandong Province are unisexual and staminate.


5a. *f. urticifolia* Fig. 2: E, F; Fig. 10

Subshrub. Stems up to 2 m tall, longitudinally sulcate, puberulous. Leaves ternate; terminal leaflets papery, broadly rhombic, rhombic, broadly ovate, elliptic, or obovate, 7–16×4–11 cm, apex acuminate, base broadly cuneate or rounded, margin irregularly dentate, 3-lobed or 3-lobulate, adaxial surface appressed-puberulous, abaxial surface reticulate, pubescent; lateral leaflets smaller, obliquely ovate; petioles 8.5–16 cm long. Panicles terminal, 3–40 cm long, 2–3 times branched, 10–many-flowered; panicle bracts foliiform or simple, oblong-lanceolate or triangular, 1.2–5 mm long, densely puberulous. Flowers polygamous; pedicels robust, short, 0.5–3 mm long, 1.2–1.8 mm in diam., velutinous. Calyx urceolate; sepals 4, violet, oblong-lanceolate or narrowly ovate, 12–15×3–6 mm, glabrous inside, appressed-puberulous outside, often 3-costate, velutinous on margin, apex acuminate, recurved. Stamens 12–16, 9–12 mm long; filaments lanceolate-linear, 5–9 mm long, 1-veined, pilose near apex; anthers linear, 4–5 mm long, apex apiculate; pollen grains pantoportate. Carpels ca. 12, 4 mm long, densely villous. Achenes compressed, broadly ovate or broadly elliptic, 3–3.2×2.8–3.2 mm, pilose, not or slightly rimmed; persistent styles ca. 2.5 cm long, plumose. Fl. Jul.–Sept.

S Korea. At forest edges or in sparse forests on slopes; alt. 700–1300 m.

Additional specimens examined:

Korea. Cholla-namdo: Kurge-gun, Mt. Chiri, Boufford et al. 25833 (PE); Kangwon-do: Mt. Jeombong-san, Qin et al. 18016 (PE), Mt. Kumgang, Koidzumi s.n. (KYO), Kondo 9135 (PE); Kogen: Mt. Kumgansan, Kitamura s.n. (KYO); Kyongsanamdo: Mt. Tii, Koidzumi s.n. (KYO); the same locality, 1937-04-23–28, Okamoto s.n. (four sheets, KYO).
Fig. 10. *Clematis urticifolia* Nakai ex Kitagawa f. *urticifolia*. A, upper part of a bisexual flowering plant; B, sepal inside; C, stamen. Drawn from Boufford et al. 25833. D, achene. Drawn from H. N. Qin et al. 18016.


Sepals flesh-coloured or rose-pink.

Korea.


Sepals white.

C Korea.

In *Flora of Korea* written by Lee (1996), the plant in the photograph (fig. 482) of *Clematis heracleifolia* DC. has flowers with very short pedicels and purple urceolate calyces, distinctly different from those of *C. heracleifolia*, and is actually a plant of *C. urticifolia* *f. urticifolia*. Moreover, the photograph (fig. 484) of *C. heracleifolia* *f. albiflora* Y. Lee in that book shows that this new form with white calyces also has very short pedicels and narrowly urceolate calyces, and thus should belong to *C. urticifolia* rather than to *C. heracleifolia*.


光蕊铁线莲 Fig. 11: E–H

Small shrub. Stems 50–120 cm tall; branches puberulous, glabrescent. Leaves ternate; terminal leaflets thickly papery, broadly ovate, pentagonous, ovate, or rhombic, 7–10 × 4–10 cm, apex acuminate, base truncate or broadly cuneate, margin dentate or denticulate, often 3–5-lobed, adaxial surface glabrous, abaxial surface sparsely puberulous on veins, basal veins abaxially prominent; lateral leaflets smaller, obliquely ovate, usually 1–3-lobulate; petioles 5–10 cm long, velutinous, glabrescent. Compound cymes terminal, panicle-like, usually many-flowered; peduncles 3.5–8.5 cm long, velutinous; bracts foliiform or small, narrowly ovate, 3–6 mm long, velutinous. Flowers polygamous, ca. 1 cm in diam.; pedicels 0.7–2 cm long, velutinous. Sepals 4, pinkish, narrowly oblong, 14–20 × 4–10 mm, glabrous inside, velutinous outside, apex mucronate and recurved. Stamens ca. 14, 4–10 mm long; filaments abaxially above with a few short hairs; anthers narrowly oblong, 2.2–3.2 mm long, glabrous, apex minutely apiculate; pollen grains pantoporate (Yang & Huang, 1992). Carpels numerous, ovaries pubescent, styles ca. 8 mm long, villous. Abortive carpels several in a stamine flower, 0.6–1 mm long. Achenes convex on both sides, elliptic or ovate, 3–4 × 1.6–2 mm, puberulous; persistent styles ca. 2 cm long, plumeose. Fl. Jul.–Sept.

China (Taiwan). On open slopes or on cliffs; alt. 1000–2500 m.

Additional specimens examined:

**China. Taiwan** (台湾): Hualian (花莲), C. C. Liao 482 (GH), Tamura, Shimizu & Kao 24737 (KYO); Pingdong (屏东), C. C. Liao 677 (GH), Y. R. Lin 123 (GH).

*C. tubulosa* auct. non Turcz.: Koidz., Fl. Symb. Or.-Asiat. 47. 1930.

Subshrub or perennial herb. Stems 10–80 cm tall, few-branched; hornotinous branches 2.2–11 cm long, terete or 6-angulate, shallowly 6–10-sulcate, puberulous. Leaves ternate; terminal leaflets herbaceous, broadly ovate, broadly elliptic, rhombic, or pentagonal, 5–17 × 2–14 cm, apex acuminate or acute, base broadly cuneate, subtruncate, or subcordate, margin denticate with teeth usually strongly reduced in size and their mucrones remained, usually 3-lobed, adaxial surface sparsely puberulous, abaxial surface more or less reticulate, sparsely puberulous on veins; lateral leaflets smaller, obliquely ovate, undivided or 1–2-lobulate; petioles 3.5–11.5 cm long, puberulous. Inflorescences terminal, 11–24 cm long, few- to many-flowered, with 1–4 nodes and with fascicled flowers; peduncles usually absent; bracts ovate, 4–7 mm long, abaxially velutinous. Flowers polygamous, 1.8–2.4 cm long; pedicels 0.6–2.2 cm long, densely puberulous or velutinous. Sepals 4, lanceolate-linear, 18–24 × 2–5 mm, glabrous inside, densely appressed-puberulous outside, velutinous on margin, apex slightly dilated and recurved. Stamens 8–11 mm long; filaments oblanceolate-linear, near apex pilose; anthers lanceolate-linear, ca. 3 mm long, abaxially sparsely pilose, apex often apiculate. Ovaries densely puberulous; styles ca. 4.5 mm long, densely villous. Achenes compressed, ovate or narrowly ovate, 2–3 × 1.2 mm, densely puberulous; persistent styles ca. 1.6 cm long, plumose. Fl. Aug.–Oct.

Japan (Kyushu, Shikoku). On limestone or in gravelly places; alt. 450–1100 mm.

Additional specimens examined.

Japan. Hirataku, Tashiro s.n. (KYO); Hyuga: Mt. Dodake, Sako s.n., Sako & Kawanaabe 22497 (KAG); Kochi: Hatagun, Yamamoto s.n. (KYO); Kumamoto, Shimizu 5230, 6023 (KYO); Miyazaki: Mt. Dodake, Shimizu 3365 (KYO); Nishigomura, Nada 24806 (KYO); Oita: Saikosai, Hatushima 19719 (KAG); Tosa, Yamamoto s.n. (KYO).

Fig. 12. *Clematis speciosa* (Makino) Makino. A, upper part of a bisexual flowering plant; B, stamen. Drawn from Dadani 24806. C, achene. Drawn from Shimizu 3365.


C. lavallei var. foliosa Decne. in l.c. 210, pl. 15. 1881. No type specimen designated.

C. savatieri Decne. in l.c. 211, pl. 16. 1881; Lavall., Clemat. 83. 1884.——C. heracleifolia var. savatieri (Decne.) Kuntze in l.c. 184. 1885.——C. heracleifolia ssp. savatieri (Decne.) Huth in Bull. Herb. Boiss. 5: 1062. 1897; Matsum., Ind. Pl. Japon. 2: 112. 1912. No type specimen designated.

C. stans var. monoica Lavall., Clemat. 83. 1884. Type unknown.

C. heracleifolia ssp. stans var. decaisneana Kuntze, var. maximovicziana Kuntze, et var. savatieroides Kuntze in l.c. 185. 1885. Type unknown.

C. heracleifolia ssp. lavallei var. lanceolata Kuntze in l.c. 183. 1885. Type unknown.


8a. var. stans

Fig. 1: G, H (see page 429); Fig. 13

Perennial herb or subshrub. Stems 50–100 cm tall, shallowly 10-sulcate, sparsely appressed-puberulous or subglabrous. Leaves ternate; terminal leaflets chartaceous, broadly rhombic-ovate, obovate, elliptic, or pentagonous, 4–12×4–10 cm, apex acuminate, base broadly cuneate or subtruncate, margin dentate, often 2–3-lobed, adaxial surface subglabrous, abaxial surface reticulate, on veins puberulous; lateral leaflets smaller, obliquely ovate or rhombic; petioles 1.5–12 cm long. Panicles usually pedunculate, 2–3 times branched, many-flowered; bracts folii form or small, linear, undivided or 3-sect, 3–12 mm long, puberulous. Flowers unisexual; pedicels 4–18 mm long, velutinous. Sepals 4, purplish, narrowly oblong or narrowly obovate-oblong, 12–16(–20)×1.8–3 mm, glabrous inside, appressed-puberulous outside, velutinous on margin, apex slightly narrowed or slightly dilated, recurved, rarely strongly recurved or circinate. Stamens 15–18, 8–10 mm long; filaments 2.2–4.8 mm long, pilose; anthers linear, 4–5 mm long, connective pilose; pollen grains pantoporate. Staminodes of pistillate flower ca. 18, 5–7 mm long, abortive anthers subulate, 1.5–3 mm long, pilose or subglabrous. Carpels ca. 20; ovaries densely pubescent; styles 4–5 mm long, densely villous. Abortive carpels of staminate flower several, 1–3 mm long. Achenes compressed, elliptic, 2–3.5×1.2–2.2 mm, puberulous, slightly tumidly rimmed; persistent styles 1.2–2.2 cm long, plumose, but with glabrous bases. Fl. Jul.–Sept.

Japan (Honsyu, S Hokkaido). On slopes, in grassy places, at thicket edges, or by lake; alt. 100–2000 m.

Additional specimens examined:

Japan. Honsyu: Aomori, Mt. Hakkoda, Faurie 868 (P), Naito 1297 (GH, MO); Chiba: Mt. Kiyosomi, Makino 76714 (KAG); Echigo, Kobayashi 12853, 14191 (S); Hyogo, Boufford 19527 (GH); Ikao, Bisset 3243 (BM); Ishikawa, Deguchi 16719 (GH), Tsugaru 7199 (GH, MO); Iwate, Suzuki s.n., Koyama s.n. (GH); Kanagawa: Sagami, Furuse 34671 (GH, PE), Mizushima 144 (GH), Yamazaki 2622 (S); Karuizawa, Fox s.n. (BM); Miyagi, Kurasawa 821 (GH); Mt. Echigo-Koma, Ohwi s.n. (K); Mt. Juji, Kubo 213 (UPS); Musashi: Nippaara, Togashi 1219 (BM, G, GH, K, KAG, LE, P, PE); Mutsu, Tamura 9309 (S); Nagano, Boufford 23495 (GH, MO), Furuse 36064 (PE, S), Shimizu 5401 (S), Tani & Togushi 513 (BM, K, P); Nakaonouma, Kobayashi 12853 (S); Saitama, Shimizu 13672 (S); Seno, Tsznitski s.n. (BM, K); Shiga, Tateishi 1205 (GH); Shizuoka: Tashiro, Konda 15778 (PE); Tochigi, Furuse 28035 (PE); Tokyo, Suzuki 273 (GH); Totomi: Senzu, Ohwi & Koyama 1108 (GH, K, KAG, LE, P, PE, S, UPS); Ugo, Ikeda s.n. (BM); Yamagata,
Fig. 13. *Clematis stans* Sieb. & Zucc. var. *stans*. A, upper part of a staminate flowering plant; B, sepal outside; C, stamen. Drawn from Furuse 36064. D, achene. Drawn from Furuse 34671.
Boufford 19883 (MO), Takahashi 309 (GH); Yamanashi, Furuse 9721 (K, PE), 29800 (PE, S), 36136 (GH, PE), Tamura & Hotta 3751 (KYO, PE), Togashi 512 (BM, GH, P); Yokohama, Maximowicz s.n. (K, P, S); Yokoska, Savatier 5 (P). **Hokkaido.** Hakodate, Albrecht s.n. (G, GH, KE, UPS), Maximowicz s.n. (BM), Yatabe s.n. (UPS).


This variety differs from var. *stans* in its shorter anthers 3–3.8 mm long.

Japan (Kyushu, Shikoku). On limestone cliffs; alt. 900–1600 m.

**Additional specimens examined:**

Japan, Higo, Gokanosyo, Hatushima & Sako 27817, 32255, Sako 1047 (KAG); Hintaku, Tashiro s.n. (KYO); Huya: Mt. Shiraiva, Hatushima & Sako 26198 (KAG, KYO); Kumamoto, Hatushima 31886 (KAG), Shimizu 5046 (KYO); Tokushima: Naka, Takato 957, 1166 (KYO).


Small shrubs. Leaves ternate or 5-foliolately pinnate. Flowers terminal, solitary, rarely in 2–3-flowered cymes, polygamous. Pollen grains pantoporate.

One species, endemic to Taiwan, China.


**高山鐵線蓮** Fig. 11: A–D

Small shrub. Stems 30–60 cm tall; branches shallowly 6-sulcate, puberulous. Leaves ternate or 5-foliolate pinnate; leaflets papery, broadly ovate, orbicular-ovate, or ovate, 1–3.8 × 1–3 cm, apex acute or shortly acuminate, base truncate, rounded, or broadly cuneate, margin unequally dentate, undivided or 3-lobed, adaxial surface sparsely puberulous, abaxially puberulous on veins, basal veins abaxially prominent; petioles 1–5 cm long. Flowers polygamous, terminal, solitary, rarely in 2–3-flowered cymes; pedicels 2–6 cm long, densely puberulous. Sepals 4, bluish or purple, narrowly oblong, 10–20 × 3–7 mm, slightly dilated toward apex, glabrous inside, densely puberulous outside, velutinous on margin, apex mucronate and recurved. Stamens 5–10 mm long; filaments pilose near apex; anthers narrowly oblong, ca. 2.5 mm long, on connective pilose, apex minutely apiculate. Staminodes of pistillate flower several, 3–4 mm long, with broadly linear filaments and thinly subulate abortive anthers. Carpels numerous; ovaries pubescent; styles 6 mm long, densely villous. Abortive carpels of staminate flower several. Achenes compressed, elliptic, 3–5 × 2–2.5 mm, pubescent; persistent styles 1.8–2.5 cm long, plumose. Fl. Jul.–Sept.

China (Taiwan). In limestone montane regions; alt. 2400–3600 m.

**Additional specimens examined:**

China. Taiwan (台灣): Hualian (花蓮), Ohwi 3162 (KYO); Yilan (宜蘭), en route from Mt. Chong-Yang-Chien to Nan-shan, Tamura & Koyama 23654 (KYO, S); Nantou (南投). Mt. Neng-kao, Tamura & Koyama 23330 (KYO, S); Taizhong (台中), Nanhu Dashan (南湖大山), J. C. Wang 3752, 3753 (GH).
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铁线莲属大叶铁线莲组修订

铁线莲属大叶铁线莲组修订

王文采 谢 磊

摘要 对毛茛科Ranunculaceae铁线莲属Clematis的大叶铁线莲组sect. Tubulosae进行了修订，确定此组含9种2变种和3变型，对此组的分类简史和地理分布做了介绍，研究了此组大多数种的花粉形态，写出此组各变型的形态特征、地理分布等，并附有全部种的插图。此组9种被划分为2亚组，其中原始群羽叶铁线莲亚组subsect. Pinnatae(有2种，1种分布于中国河北和东北，另1种产日本)在木质藤本习性、花构造、花粉形态(具3沟)等方面与威灵仙组sect. Clematis颇为近似，区别主要在于萼片在开放初期近直立，以后平展，雄蕊花丝被毛，此亚组可能源于威灵仙组。进化群大叶铁线莲亚组subsect. Tubulosae(有7种，分布于我国东部、北部和台湾，朝鲜和日本)为直立多年生草本、小亚灌木或小灌木，花通常杂性，萼片直立(花萼呈筒状，稀呈坛状)，顶端或上部反曲，雄蕊常有毛，花粉通常具散孔，只在1种(原始种大叶铁线莲C. heracleifolia)具3沟，此亚组可能由羽叶铁线莲亚组演化而来。

关键词 铁线莲属；大叶铁线莲组；毛茛科；分类学修订